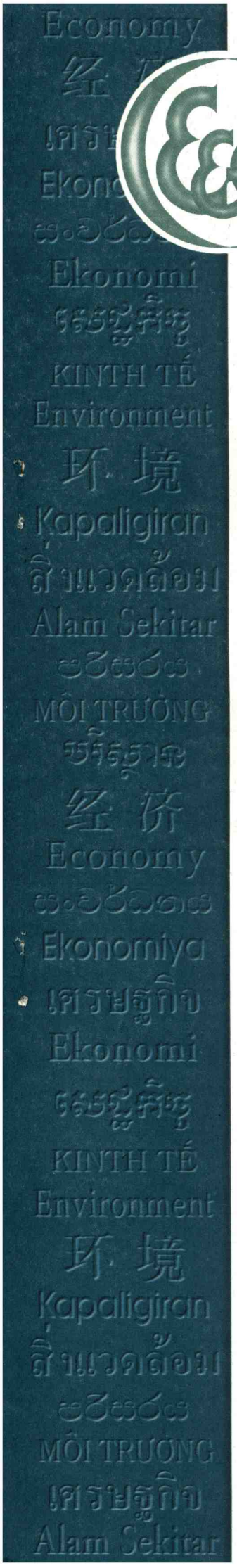

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Research Issues in Environmental Tax Reform

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RESEARCH ISSUES IN ENVIRONMENTAL TAX REFORM

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INTRODUCTION

If EEPSEA's long range goal can be described in a few words, it would be to answer two questions: "What would a sustainable economy look like?" and "How do we get there from here?". Answers to these questions must be based on answers to smaller ones.

In many OECD countries, up to half of all capital generated passes through the tax system. It is also increasingly recognized that the effects of the tax system on efficiency, growth, savings, investment and employment are much greater than previously realized (Whalley, 1994). Developing countries are also going through significant changes in thinking about taxation as a result of structural adjustment and trade liberalization, which have reduced traditional sources of tax revenue. Environmental considerations, particularly concern over the effects of various subsidies and the debate on trade and environment have focused even more attention on the tax system. Logically, one of the questions we need to answer is "What kind of a tax system would a sustainable economy have?".

This paper sketches out some of the research issues involved in analyzing environmental tax reform (ETR). It is a very informal paper, which takes the form of a table and several pages of explanatory notes. Its purpose is to provoke discussion about researchable issues that might be addressed by EEPSEA-supported researchers in SE Asia. The paper presupposes some familiarity with the literature on ETR, particularly the monographs by Repetto et al (1992) and OECD (1993).

Those studies deal with OECD countries, however. Developing countries have received little attention although their pre- and post-ETR tax systems are likely to be very different from those of OECD countries. The capability to design and enforce alternative tax systems is likely to be different as well. The danger of extrapolating from studies in OECD countries is great and the justification for research in developing country contexts quite strong.

ETR connotes a comprehensive approach to the application of environmental taxes and economic instruments and their combination with conventional taxes and other sources of public revenue. The intention is a revamping of the entire tax system, rather than the ad hoc addition of new taxes to the existing system. This is quite different from the analysis of individual economic instruments or taxes. So far the latter approach has been more common.

Research on environmental taxes appears to face one of two shortcomings. Research on individual economic instruments is undoubtedly useful but it is not particularly novel. Research on ETR is novel but could be extremely demanding.

Research projects of considerable size, duration and complexity might be required. This paper proposes a framework within which partial research could be situated. The framework takes the form of a table or matrix, in which various kinds of analysis are applied to different revenue sources. (The table is presented and then annotated on the following pages.) If research resources were unlimited, we would fill in every cell of the matrix with real data to provide a comprehensive analysis. This is clearly impossible.

Two second-best approaches for any research project would be: a) to fill in only a few cells with real data through empirical work; b) to fill in more cells with hypothetical data through modelling. The table is annotated below.

ENVIRONMENTAL TAX REFORM: SOURCES OF PUBLIC REVENUE AND RESEARCH ISSUES

Revenue Sources

Public utility tariffs	Conventional taxes & quasi-taxes	Eco-taxes

Research Issues

1. Description of Current System
   - list of taxes & their weights

2. Environmental Aspects

   a) identify env. impacts
   b) quantify env. impacts
   c) set appropriate tax level
   d) firm/industry responses
      i) technical change
      ii) structural change
   e) iteration between c & d

3. Fiscal Aspects

   a) robustness of revenue
   b) stability of revenue
   c) resistance to inflation
   d) pros & cons of earmarking
   e) administrative feasibility

4. Economic Aspects

   a) effects on competitiveness & employment
   b) incidence (Y distribution)
      i) costs
      ii) benefits
   c) political feasibility (based on a & b)

REVENUE SOURCES

Any discussion of this topic immediately faces problems of definition: What is an environmental tax? What is a tax per se for that matter? A comprehensive view of the sources of public revenue and their implications for the environment would ideally cover three kinds of revenue sources. (The table lists these along the horizontal axis.)

a) Public utility tariffs. Charges by public enterprises for water, electricity and other services are potentially a source of considerable revenue. While many such enterprises currently lose money because of underpricing, MOC pricing (in the common case where MC > AC) could result in financial surpluses.

b) Conventional taxes and quasi-taxes. These include personal and corporate income taxes, VAT, import duties and export taxes, and other measures. Developing countries often rely heavily on "quasi-taxes" like betterment levies and surpluses (if any) from public enterprises.

c) Eco-taxes. These include energy taxes, resource rent taxes, taxes on environmentally harmful inputs, emissions charges, and others.

Most governments derive revenue from all three of these sources, including c). But the range of eco-taxes in use and the level at which they are applied generally fall sort of their potential. For example, the level at which most eco-taxes are applied is sufficient to provide some earmarked revenue for environmental programs, but not high enough to cause changes in behaviour. ETR significantly increases the number and/or level of eco-taxes. The additional revenue might be used for environmental investments; to reduce government deficits; or to compensate for a reduction in conventional taxes (a "revenue neutral" approach).

EEPSEA-supported research on ETR would concentrate on revenue sources a) and c). Limited attention might be paid to b), mainly through secondary literature. Source a) is being explored through EEPSEA research on MOC pricing of water and other resources. Issues in MOC pricing are not raised here because they are discussed elsewhere (J. Warford, 1994).

RESEARCH ISSUES

In an ideal world, each of these steps would be followed for all current and potential taxes. All cells in the matrix would eventually be filled. In the real world, researchers might investigate as few as one cell of the matrix in a first phase and extend the analysis horizontally or vertically in subsequent phases. These steps can be carried out for a single tax, a set of taxes, or set of substitutes (e.g. what happens if we reduces income taxes and increase energy taxes?).

1. Description of Current System

Existing literature should provide a list of the current sources of government revenue and the percentages of total revenue derived from each. Some idea of how these percentages have changed in the last 15 years would also be useful, along with an indication of any problems or likely future trends, ceteris paribus (E.g. Is there external pressure to move toward a VAT? Are enforcement costs becoming prohibitive for some taxes? Is trade liberalization reducing revenue from trade taxes?)

2. Environmental Aspects

a) Identify environmental impacts of current taxes

Conventional taxes. It may be that conventional taxes contain perverse incentives and that lowering those taxes would create environmental benefits. For example, it is conceivable that investments in environmentally friendly technologies are discouraged. Such examples are not immediately obvious, however. Corporate income tax may discourage investment in general, but there is no obvious prime face case that it is a greater disincentive for environmental investments. Arguments in the ETR literature (Repetto) for lowering conventional taxes stem not from any environmental impact of current levels, but from deleterious effects on savings, investment and employment.

The more obvious effects comes through tax expenditures and subsidies. (Tax expenditures are tax breaks: reductions in taxes to below normal levels, even to zero. Subsidies involve transfers from government to firms or households.) These are areas in which conventional taxes (broadly defined) probably need to be raised, to levels that are at least greater than zero. Here the literature is fairly abundant. Here again, problems of definition and scope appear. Subsidies clearly have important revenue and environmental implications, but including them in the research framework broadens the scope considerably. Many are also included in public utility tariffs.

Ecotaxes. Current levels are low or nonexistent and it is assumed that they need to be raised. Unlike the case of conventional taxes, this research is mainly hypothetical: what would the effects of tax changes be? (See 2c.)

b) Quantify current environmental damage

Various valuation methods are available to quantify the damages caused by current practices. Each method has its pros, cons and practical limitations. In general, the method chosen should be compatible with the purpose of the tax. For example, if the purpose of the tax is to reduce pollution by inducing changes in production practices (rather than to finance end-of-pipe clean up programs) then it would not be appropriate to use cost of cleanup as proxy for environmental damage. (Even if the eco-tax is a user charge levied to cover the cost of a joint waste treatment facility, using cost of cleanup would have to be done with care. That cost will depend on the standard to be achieved; ideally that standard should be the outcome of a cost-benefit analysis, not an input into the analysis.)

c) Set appropriate tax levels

This is the most critical step in the design of an eco-tax. In principle, it should be set at a level such that the value of the damage avoided is equal to the cost incurred in avoiding it (i.e. drawing on cost-benefit analysis). This would require knowledge of the likely response of firms to pollution taxes: e.g. how much reduction in pollution is likely to result from a given emissions charge? In the absence of such knowledge, the government might begin with a fairly low tax level and gradually increase it according to a pre-announced schedule, until the appropriate level is reached.

Further adjustments may be needed over time as responses to initial tax levels become clearer. Also, strong economic growth may overwhelm reductions in pollution intensity, especially where pollution results from the production of goods for which demand is highly income-elastic. New information may call for the reassessment of the severity or value of environmental damages, and so on.

d) Firm/industry responses

Firms have two basic choices in responding to an eco-tax: to change their production technology or to leave the industry. Factors affecting this choice include: the speed with which the tax is introduced (suddenly, or gradually increasing over time); vintage of the capital stock; longevity of capital stock; rate of growth in the industry; cost of capital; availability of new technology, influenced in part by import barriers; and other factors.

Taxes at levels that encourage some technical change may be acceptable to industry and the general public. There may be cases, however, where the optimal tax will actually lead not only to the exit of firms from an industry but to the disappearance of an industry itself and (one hopes) the employment of those resources in an alternative use. This eventuality is much less accepted but may be necessary if real progress is to be toward sustainable development. It may not be possible to predict which effect an eco-tax will have, since the feasible rate of technical change is not easy to predict, but such information is clearly important.

3. **Fiscal Aspects**

To be attractive to policy makers, eco-taxes must not only deliver environmental benefits but also be financially viable. This aspect is somewhat less researched and provides opportunities for public finance economists who do not have extensive knowledge of the environmental literature. Since the literature on fiscal aspects of conventional taxes is abundant, EEPSEA need not add to it. We could, however, draw on the methods and findings of such literature in studies of eco-taxes.

a) Robustness of revenue

Eco-taxes, like other taxes on "bads" (e.g. alcohol and tobacco) have a peculiar feature: their success in discouraging the undesired behaviour will reduce the tax base (to zero if completely effective.) To maintain revenue, the tax rate must be

continually increased. How feasible is this? Can automatic and/or market-based mechanisms be incorporated to avoid the need to continually revise rates, as Singapore has done by auctioning automobile permits?

b) Tax elasticity / stability of revenue

Taxes vary in the degree to which changes in the tax base affect revenue (e.g. resulting from fluctuations in the business cycle).

c) Resistance to inflation

Both the revenue generated and incentive effects of a tax can be eroded by inflation. (e.g. if the charge for one unit of emissions remains constant in nominal terms but declines in real terms). Indexing of emissions charges to inflation rates has its pros and cons. On the other hand, progressive personal income taxes produce more real revenue under high inflation because taxpayers move into higher tax brackets as their nominal incomes increase. While few Asian countries face the hyperinflation for which Latin America is famous, the degree to which eco-taxes are susceptible to erosion by inflation could be relevant in some countries.

d) Earmarking

Directing the revenue from a specific tax to a specific purpose is common in eco-taxes and often increases the political acceptability of a new tax. However, the prevailing opinion in public finance circles seems to be that earmarking is neither effective nor efficient.

A related question is which agency collects the revenue, which spends it, and which bears the costs of collection and enforcement. While earmarking may not be optimal, tax collection is unlikely to be effective if an underfunded agency bears the cost of tax collection but receives none of the receipts. On the other hand, there was considerable controversy when in June 1994, Cambodia decided that revenue from stumpage fees would be collected by and accrue to the Ministry of Defence, rather than the central government budget, as had been the case previously.

e) Administrative feasibility

Some taxes which are desirable in theory can be prohibitively difficult or expensive to administer. (Bangladesh is said to have a VAT, 70% of whose revenues are consumed by collection costs.) The administrative feasibility of an eco-tax will be affected by many factors: the data and skills need to design the tax; the amount of information (e.g. on emissions) needed to administer the tax; susceptibility to evasion; number of tax payments to be made and accounted for and so on. Costs to the taxpayer should also be considered.

4. Economic Aspects

One of the strongest arguments for ETR is that it provides a "double dividend": The introduction of new eco-taxes reduces environmental damage while the reduction

of conventional taxes reduces disincentives to saving, investment and work. The combined result should be both economic and environmental benefits. Some work has been done to measure the welfare gains from reducing conventional taxes in revenue-neutral ETRs for OECD countries. It would be useful to do it as well for developing countries, where current systems of conventional taxes are quite different.

In addition, some of the economic/welfare impacts of eco-taxes could be investigated. Two topics are suggested below.

a) Effects on competitiveness and employment

It follows from the above that some firms will find it more difficult to compete, especially internationally, after an eco-tax has been imposed. Some firms may go out of business, causing an immediate employment loss. However, the nature of the technical change itself could, in theory, be employment creating, offsetting this loss. (For example, there seems to be considerable scope for substituting labour for energy in developing countries.)

General equilibrium effects could also be important. As relative prices change, there will be incentives to expand less environmentally damaging industries. The amount of employment generated by the shrinking and expanding industries may differ and there are reasons to believe that many environmentally friendly industries will be more labour intensive than those they replace.

Finally, the effects of a full blown tax reform - one which reduces some conventional taxes - needs to be factored in. Studies for OECD countries show a large potential for employment expansion resulting from reduction of payroll taxes.

b) Incidence (income distribution)

The incidence of an individual tax or a new tax system is of great social and political interest. The incidence of both benefits and costs needs to be assessed.

An eco-tax should result in an environmental improvement, the beneficiaries of which can be identified. Frequently, but not always, they will be the poor, who lack the means to shield themselves from generalized environmental hazards by buying bottled water or air conditioners. This needs to be verified, however, not only asserted. Furthermore, short run and long run beneficiaries may be different. Sewerage, garbage disposal and clean water could make a squatter settlement an attractive area to live and result in evictions.

A method for assessing the incidence of costs has been suggested by Besley and Kanbur (1988). While it is common to estimate the percentage of a family's income allocated to the good whose price is increased, they propose a different measure: the proportion of total consumption of a good consumed by the poor.

CONCLUSION

This research agenda includes but goes beyond environmental economics. Examining the fiscal aspects of eco-taxes, for example, is straightforward public finance economics. EEPSEA's mandate is not restricted to environmental economics, however. It aims to understand the effects of environmental policies on the economy as well as the effect of economic policies on the environment. Research on ETR has elements of both.

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